PyroTechnics

THE NOW & THEN NEWSLETTER OF
GENERAL TECHNICS

PERPETRATED LARGELY BY
JEFF DUNTEMANN
& MIKE O'BRIEN

GENERAL TECHNICS

NO. 5 DECEMBER 1976

HAPPY BIRTHDAY TO US

Yes, it was just about a year ago that a group of technically orientated crazies convened in Steve Johnson's LED-scattered garret and decided that in union there is a definite advantage. Typically, it took months to get anything even so basic as a name decided upon. I pushed hard for "Norlamin", after Doc Smith's planetful of crazy old techies, from "Skylark." I was outvoted by the John Brunner coalition. General Technics it was, lifted with written permission from the pages of "Stand on Zanzibar."

On our first birthday we have thirty-plus members, a journal to be proud of, and a growing reputation. "Techie" is now an utterly respectable word. We have made a lot of friends, drunk a lot of beer, eaten a lot of triscuits, and lit a lot of LEDs.

Where do we go from here?

Let's ponder where we're at. A number of people have commented that we aren't into technology so much as we are into electronics, and the two are not synonymous. It's a valid gripe, but there may be reasons for it. What is technology, anyway? It's bending the physical universe to your will for some definite purpose. It's "making things."

Making things implies the use of tools. As a group we are not the wealthiest of beings, so our access to tools is limited. What does it take to make a transformer? Punch presses, wire dies, forges, god knows what else. But...you can order one from Poly Paks for ninety eight cents.

Get the idea? Electronics is prefab technology. Somebody else does the hard stuff, and you can build a microcomputer on your kitchen table. With maybe twenty or thirty bucks worth of tools, tops. How else can you do so much with so little? I am also into telescopes, and my ability is limited not by my ability but by my lack of a lathe and bandsaw. And if I did not have the large collection of hand tools that I do have, I might never have attempted a telescope at all.

There are other technologies out there. Let's make it the business of General Technics to broaden our horizons beyond Ohm's Law. What can you tell us about chemical manipulation at home, Tom Andrews? How about a word or two on darkroom technique, Jim Fuerstenberg? I'll have a thing or two to say about telescopes in future issues, as well as some things about kites which might surprise you.

The future holds interesting things. Techie-Talkies. Techie camping trips. More wild times at cons. Sharing what we know, picking up pointers here and there. From your imaginations and your hands come the future directions of General Technics. Let us know what you want us to do. PyroTechnics is our forum, our professional journal. Let us communicate, and we will grow.

Christmas? Ah yes, another sort of birthday. This is not the place to discuss theological preferences. So let's call it the birthday of love and wonder and curiosity, and all the inexplicable things that make us human beings and not cinder blocks. Carol and I would like to wish all of you old and newfound friends the best of Christmases. Let all that makes us human be born again in you, and may the new year find you enjoying our very beautiful universe more than you ever did before.

QUARKS

I've been assembling the DVM-frequency counter project described in QST magazine in a series of articles from January to October. I've heard the design is excellent and the theory is explained every step of the way. With careful shopping you can make the thing for about fifty bucks. And for what you get, that's cheap.

Doug Price is having problems with his galvanic skin-response bar-graph LED bio-blinker. The LED bargraph doesn't work as well as it should.

Doug is also working hard coordinating WISCON (bring your own sin) in Madison, Wisconsin, February 11-13. PGOH: Katherine Maclean. FGOH: Amanda Bankier. Four bucks advance, six at the door. Make checks payable to University Extension. Panels on fantasy, feminist SF, frontiers of science, SF in Education, contemporary SF. Video tape programming. Other Diverse Delightes. Housing at Lowell Hall. Send one day's deposit with reservation: 15 bucks single, 18 double. Address: WISCON, Box 1624, Madison, WI. 53701.

I still have a number of copies of the GT Ripoff CMOS Databook. This is a stapled set of selected 4000 series IC data sheets from National. It contains pinouts, maximum ratings, response curves, application suggestions, and whatnot. Anybody who wants one give me a shout. I'll mail it to you. Should take two or three stamps.

Does anybody out there know anything about laser diodes? I realize you goofs aren't interested in a laser unless it can punch a hole in two tanks and an aircraft carrier, but come back to reality for a moment and ponder how much a real gas laser costs. A simple, cheap source of coherent light is a consummation devoutly to be wished. How about a pocket hologram viewer?

A theory or construction article on laser diodes would be most welcome here. I'd also like to see material on fiber optics, actual microcomputer programs, plastic forming, or other offbeat techie pursuits. Writers will receive my heartfelt thanks and all the triscuits they can eat when they drop by.

GENERAL TECHNICS is an organization of fannish techies (and not techish fannies, as some wiseass reported) who share data, resources, and experienc in pursuit of a good time and occasional profit. The group meets mainly at cons, hamfests, and private Berserker Weekends.

MEMBERSHIP is terribly difficult to obtain. You must somehow scrape up a number of 13¢ stamps, and then at great effort write a letter explaining what your qualifications as a techie are to

Jeff Duntemann
6424 N. Albany Avenue
Chicago Illinois, 60645

including those stamps. If the above person can read your handwriting you are an

APPRENTICE TECHIE and entitled to call yourself a member of General Technics. You will also receive

PYROTECHNICS until your stamps run out. Renewal of membership is synonymous with sending more stamps. If you decide to quit, we will use one of your stamps to send the rest back to you. If you're nuts enough to want to become a

SECRET MASTER UV TECHNOLOGY (SMUT) you had better talk to

Tullio Proni
1309 Wells Place
Kalamazoo Michigan, 49001

because I don't have anything to do with it.

ANYTHING ELSE, ask me. I may not know but I'll tell you anyway.

GT AT CHAMBANACON

Chambanacon is traditionally a lay-back, party-type con without a lot of scheduled activities. It's a get-acquainted con, and we did quite a bit of that, as a group, this time.

A meeting held in Steve's room on Saturday afternoon drew the largest crowd we have ever had at any sort of meeting, anywhere, any time. Before we were through, eight new people came into the fold, and we all made a lot of new friends.

The usual pleas were made for material for PT, announcements of one sort or another. These should be crystallized in the new masthead. Read it.

The next major midwest regional con is ConFusion, in Ann Arbor January 28-30. George Ewing and Dave Hoornstra told us about a partly-built robot somewhere in Ann Arbor which was conceived as a sort of remote-controlled beer (not spear) carrier which would obediently follow us around and dish out the cold stuff as required.

Its body is a Lawson Torpedo, which to you ignorant types is fancy talk for one of those round-topped, swinging-door garbage cans you find in public johns. It runs on two motors and a car battery. Presumably it can be steered by switching one or both of the motors on or off as required, or varying the voltage to the motors somehow.

That part hasn't been worked out. However, George felt sure the machine could be pulled out of mothballs in time for ConFusion, if we could somehow come up with a guidance system. Steve, Tullio, and I are turning it over in our heads. Watch PT for more news.

The con presented us with a weird coincidence of techie need and supply. I arrived in my work clothes. In my pocket was a 20 amp triac I had removed from a machine in suspicion of failure. The thing turned out to be good, however, and I was going to add it to my junkbox. When I got to Champaign, wouldn't you know it, Steve was hunting down a Radio Shack to buy a triac. Seems he had a plan to use a 555 to gate a triac and strobe all the hall lights from a trespassed junction box. The plot never went through, but it goes to show you: when you're among techies, ask and you may receive. There's gold in them thar pockets, son.

Tullio unveiled his newest creation, the Proni Vibro-Blade. Touch a skin-resistance detector spot on the hilt of a plexiglas dagger and it flashes a brilliant pink-purple. The blade is carefully sculpted, and it's positively frightening in a dark room, waved under somebody's nose. It's one of its kind, to be made by special order only.

Tullio placed several items up for sale in the Art Room; however, none of them were bid on.

We freaked out a cook at Garcia's Pizza-by-the-Slice with a Proni pocket blaster. He scared the crap out of the other cooks by making an abrupt rude noise and pointing it at the chap's nose.

It was a damn good time, all around. How many of you will be in Ann Arbor for ConFusion? It looks like GT will have a pretty fair turnout. Carol and I will be weekending it on Amtrak. If anyone else thinks they can afford it, we might consider getting together for a Railcon in January. How about it? All aboard, techies!

* * *

THE PRODUCTION DEPARTMENT

While it's been here all along, little has been said about the GT Production Department. Perhaps that's because there are only three of us, more or less, and perhaps everybody knows about us and is a little jealous. Well, in any case, to become a member of the Department all you have to do is build some goodies and sell them, usually at a con.

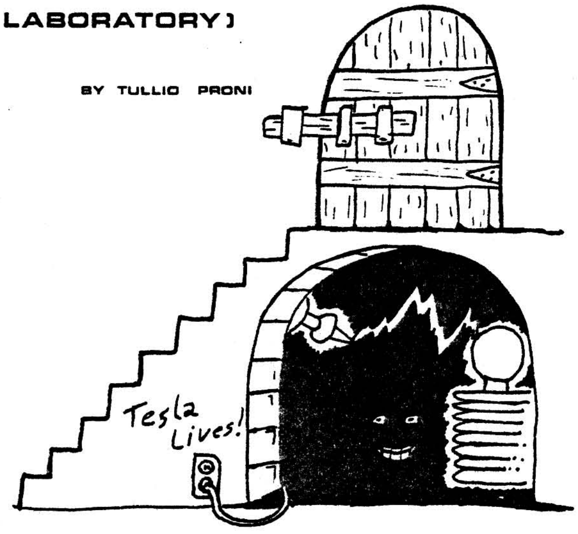
Thus far the goodies range from etched name-tags to sonic blasters. We have three basic aims in turning out these goodies: First, being true techies, we like to build SF and not just read about it. Secondly, selling these devices at cons allows us to meet techies, and spread the fame of GT. And finally, we have nothing against making a little money. We also have nothing against selling other members' goodies (Relax, girls, he doesn't mean that. --Ed.) if you have something SFish to sell. Contact us. We usually have a table at cons we attend and can always use someone to share the cost. If you have something to sell or want to help us sell our things, or (better yet) if you want to buy something, contact one of the following: Jim Fuerstenberg, Steve Johnson, or Tullio Proni.

In the future we'll use this column to report on new devices and our fortunes and misfortunes. For the moment I'll limit myself to describing our latest creation. Direct from the mills of Kalamazoo comes a 2" x 2-1/2" solid brass pendant in the shape of the GT insignia. This fine piece of craftmanship can be had for a mere $2.00 if you are a master and $5.00 if you are an apprentice. If you want it mailed it will cost an additional 50¢ for postage. Also, smaller sizes can be arranged in case you have a weak neck. In fact, given enough money, we can arrange almost anything.

-TP

NOTES FROM THE UNDERGROUND (LABORATORY)

BY TULLIO PRONI


Tesla Lives!

Greetings, fellow seekers of cosmic powers. The time has again come to speak of many things: of ohms - and volts - and darlingtons - of circuits and other things. It also wouldn't hurt if I gave you those improvements for your alarm system which I promised last time. If you recall, last issue I talked about a simple but effective alarm system which I used to guard my room at college (if you don't recall - fake it).

One of its faults was that it used magnetic reed switches to deactivate the alarm. This was bad in that it required you to carry a magnet around with you. To improve the system I tried using several capacitance and FET circuits. These circuits would theoretically activate when you touched a plate, however, they also tended to go off when a drill, transmitter, or thunderstorm was in the area. I then hit upon the idea of simply using a pair of transistors. Figure 1 shows the circuit I came up with.

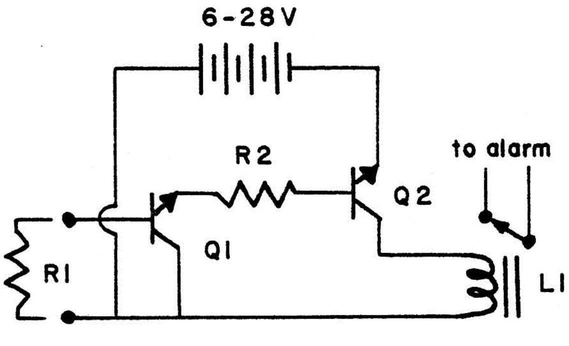


Fig. 1

In this circuit Q1 and Q2 are general purpose NPN's, R2 is a 5K resistor, R1 is your finger and L1 is a SPDT relay drawing less than 200ma. The circuit acts as a simple two stage DC amplifier with your finger supplying enough bias to turn Q2 completely on which in turn allows L1 to pull in, deactivating the alarm circuit. In practice the base of Q1 and the positive end of the power supply are soldered to two nails driven through the door. When exiting, a finger is placed across the two nails, deactivating the alarm. The alarm power supply is then turned on, the door is closed (with you on the outside) and the finger is removed. To enter the process is reversed.

This circuit works well enough if you have a fairly low resistance finger, however if you have very dry hands you may not be able to get Q2 to turn completely on. If this is the case just substitute a darlington for Q1. This will probably give you too much gain so you should add a resistor (about 1 Meg) between the base of the darlington and negative. If you wish to drive a heavier load substitute a power transistor for Q2. This circuit using a darlington and power transistor is quite useful and can replace mechanical switches in such things as flashlights and door bell systems. But enough of this, let's look at another improvement you can make in your alarm system.

At times you don't really want to set off an alarm when something happens but you might wish to know how many times it has happened. In this case what you need is a counter. Electro-mechanical counters are fairly cheap (PolyPaks Inc. has a good selection), however they have one minor problem - they are activated by a current pulse. If hooked up in series with a switch and if the switch remains closed for any length of time, they tend to burn up. To avoid this the circuit shown in Fig. 2 can be used.

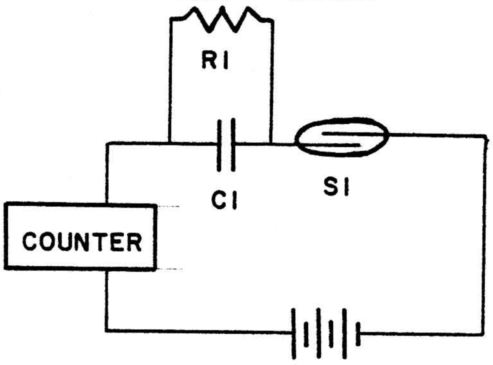


Fig. 2

In this circuit S1 is a magnetic reed switch mounted on a door frame so that a magnet mounted on the door keeps its contacts open as long as the door is closed. The circuit operates as follows:

1) S1 is open and C1 is discharged.
2) S1 closes as the door is opened.
3) Current flows through the counter charging C1 (a small amount also flows through R1)
4) This current is initially enough to activate the counter but quickly drops. This produces a current pulse and the counter advances one count.
5) The capacitor, when charged, allows no current to flow through it and the current flow through R1 is too small to activate the counter.
6) As long as the door remains open nothing changes.
7) When the door is closed C1 discharges through R1, thus readying the system for another count.

Typical values for C1 are 100µf and 5K to 500KΩ for R1. The exact values depend on how fast you wish to be able to count and on the resistance of the counter. The counter should be of a D.C. type and the capacitor should be rated at your supply voltage or greater. If you really want to get fancy you can use an electronic counter such as the 74C925. This chip is a real beauty (though a bit expensive) in that it contains a four digit counter and decoder. All you need besides the 74C925 are seven resistors, four transistors, and a four digit common cathode display. Unlike the electro-mechanical counters it can be hooked up directly to a switch and can count faster than anyone can open and close anything.

Well, that's enough for now. Next time we'll see what evil things one can do with a VCO.

--Ciao

KING ZOR VS. THE NICAD MONSTER

BY JEFF DUNTEMANN

Batteries. Ugh. You know, like two weeks after Christmas 1964, when King Zor wouldn't growl and do his monstrous thing anymore. You opened his belly and found six bulging Sayonara D cells leaking pasty shit all over the place, and gave the whole mess in disgust to your little brother.

If King Zor were alive today, you could feed him NiCads, and he'd still be chasing GI Joe around the Christmas tree. And at night you'd just plug him into the wall. Crap, you could play with him until you died of old age. Here's the inside story on what to do with NiCads.

Zinc-carbon cells generate electricity by chemical action. The zinc is the fuel, in a way, and when it's gone, it's gone. "Recharging" them lowers the internal resistance a little, and lets you squeeze a little more out. You didn't actually put anything back, though. You just made available what was already there.

NiCads generate no energy of their own. You put it in, you take it out. You must put in about 50% more than you expect to be able to use. The rest is dissipated as heat during the charging process.

To charge a NiCad, you simply connect it to a power supply of filtered or unfiltered DC. The only trick is controlling the rate of charge, and that is all-important.

NiCads generate oxygen gas on their negative plates during charging. The batteries are designed two ways: Vented cells have holes that let the gas escape. You can charge them at tremendous charge rates, and "fill" them in ten or fifteen minutes. Of course, you can't tip them over, or the electrolyte will spill out. King Zor all over again.

Sealed cells are designed to be able to absorb the gas to a great extent, but there is a strict limit to charge rate. Above that, and the gas pressure can make the cell explode. Most NiCads have an ampere-hour capacity rating printed on them. The ampere part of that rating is called "C". Charge rates are spoken of in terms of C.

To fully charge an AA NiCad with a 500ma/hr rating, you could apply 500 mils for an hour and a half. This is charging at the rate of 1C. Don't attempt charging a sealed cell at a faster rate. It's been done, but some cells won't take it. Overcharging a NiCad will almost certainly shorten its useful life greatly, even if it does not destroy it.

Most manufacturers suggest charging a cell at .1C for sixteen hours. At a leisurely .1C the cell can absorb the extra gas almost indefinitely without being damaged, so there's little worry of overcharging. If you leave it in for a few extra hours, no sweat.

Chargers for NiCads are simplicity cubed. Start with an unregulated DC power source at least twice the battery voltage. Next, decide what charge rate you want to use, and determine the value of a series dropping resistor by Ohm's Law.

Let's say you want to charge a battery of AA NiCads rated at 500ma/hr. .1C=50 mils. If your supply is at 40V, you have to drop 28V across the resistor. R=28/.05, or 560 ohms. The resistor will have to dissipate 1.4 watts according to I^2R, so don't try to use those little tenth-watt jobs.

That's your charger. I built one recently as an addition to a pass transistor power pack for running 12V mobile radios on the bench. It works well, and is a nice problem in pass-transistor design.

Start with a well-filtered supply giving you at least 25 volts at the big cap. (This is for the benefit of the NiCad charger.) Use a 1-watt Zener. The only tricky component is R, and that's not very tricky. Use this formula:

$$\frac{\text{Voltage at A - Zener voltage}}{\text{Highest load current}/\beta}$$

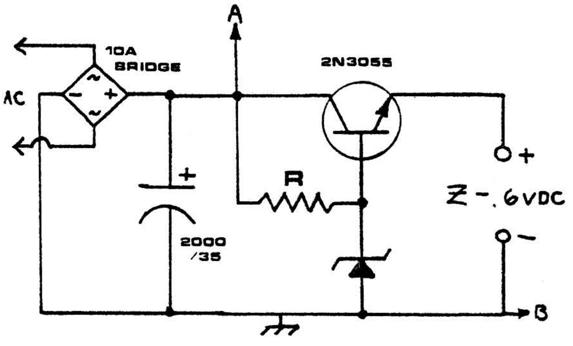
β on the 2N3055 ranges from 30-70, so there's a lot of slop in the equation. The resistor should be between 800 and 1000 Ω for a 12V supply starting with a 32 volt source. The circuit is simple enough to "breadboard" loose on your bench with alligator clip-leads. Insert ammeters here and there in case you messed a decimal point somewhere.

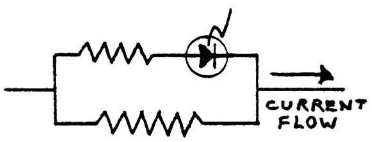
The output voltage will be the Zener voltage minus the .6V across the emitter-base junction of the transistor. A 13 or 14 volt Zener is ideal for a bench supply simulating an auto battery under driving conditions. Zeners are inherently noisy devices, so bypass the Zener and the output post with about 10 µf. If you intend to use this circuit to power TTL (James stocks a 5.6V Zener) better make those tantalum, and keep the leads short.

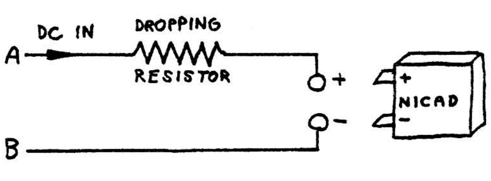
The NiCad charger part you design as mentioned earlier. On my supply I made a little well with contacts on the bottom to mate with the charge contacts on my amateur talkie. I just pop the whole radio in and it starts charging. I pull it out when it's done.

Another neat trick is to use the voltage drop across the series resistor to power an LED. This will come on only when the charger is charging. Just determine what your resistor should be, and then figure an equivalent resistance in the configuration below. You might again test with an ammeter to make sure you've got it right.

--JD







IT MAY OR MAY NOT COME IN THE MAIL

-THOUGHTS ON PARTS

I completely forgot to mention the second Santa Fe Hamfest last issue. It's old news now, but in terms of GT it was a rousing success. We got there early this time and picked out a good spot somewhere on the fringes; most of the people had been there since the night before. Steve Johnson arrived late, and he had the card table, so for awhile we piled things on the hood of Jim Fuerstenberg's car.

In attendance were myself, Tullio, Steve, Gus, Jim, Kathy, and Dave Corner. On sale were a set of encyclopedias, a 250 watt radar pulse amplifier tube, a beat-up microscope, assorted books, Dave's Test-'em-Here Zeners, Tullio's assorted computer pieces, an AM tuner (!) and Gus's ubiquitous LED's.

It was hotter than a 6146A running 75 watts on 6 meters, and the lemonade I had made went very fast. We were about 20 feet from the Santa Fe tracks, and a freight went by every half hour, making Kathy jump half out of her skin.

Gus cleaned up. He sold almost seventy bucks worth of LEDs. Tullio also did well, with about 35 in sales of his odds and ends. I sold 17 bucks worth of junk and didn't unload half of what I had brought.

We took turns sitting by the table while the rest wandered around and bought what they needed from the hundreds upon hundreds of other dealers present. Gus turned most of his profits into items he needed. The rest of us just had to spend more than we made.

A lesson learned: beware of ICs bought at hamfests. I picked up LM380's at five for a buck. Every last one of them was bad. I'll recognize the guy's mug if I see him at another hamfest, but of course all I'll be able to do is insult him. With the prices of ICs as low as they are in the backs of magazines these days, it makes a lot more sense to order by mail. The mail-order boys are fiercely competitive, and I have yet to hear of one who wouldn't replace a bad IC sold as tested and guaranteed good. And prices at hamfests, once very low, have leveled off while magazine prices have continued to drop. Be patient -- shop by mail -- and save!

A gold star goes to S.D. Sales. I have dealt with them three times now. They have not back-ordered or mis-shipped anything. Shipping time was nine days in each case. Their selection is a touch limited, but their prices are good. Their digital alarm clock kit is superb.

I don't believe Delta Electronics. Last May I sent for four strobe flash units at three bucks per. Two were good, one needed repair, and one was broken in half. I shipped the unrepairable one back, requesting that it be replaced. Great silence. Finally, four months later, I receive a three-buck refund check. Not a peep out of them in the interim. The only good thing I have to say is that they have nifty checks: The background is decorated by pictures of loose transistors and ICs. They do stock a lot of weird stuff, especially transformers, but their customer service leaves a lot to be desired.

Again, nobody is letting me know their experiences with mail-order and other parts dealers. This column's purpose is to pass the word on good and not-so-good places to buy parts. Share your experiences! The address is on the masthead.

Latebreaking word: Do not deal with Mini-Micro Mart. Every person at the recent GT meeting who ordered from them got screwed one way or another. Let's take our business elsewhere.

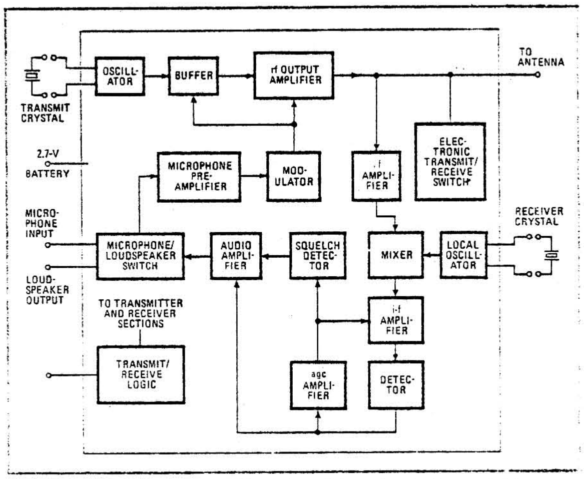
We have a tentative excellent review for Adva Electronics from Doug Price, but I would like to see a couple additional reports before we decide on them. Anybody else deal with Adva?

TECHIE-TALKIES

When we last left our hero, he was struggling to come up with a small, powerful, cheap, easy-to-build transmitter stage for the much-discussed (and little seen) techie-talkie project. Having just returned with the golden fleece and Medusa's head on his shield, he figured it'd be a snap.

However...many gnashed teeth later, the transmitter is still a large, bulky, very inert piece of perfboard. The project was in very grave danger of being shelved as too much for one harried newlywed techie.

In the midst of all this despair drops Deus Ex Machina Rod Smith with the news that Lithic Systems, a custom chip designer from California's Silicon Valley, has come up with the LP2700. Hold onto your seats and take a look at this, gang:



All-in-one. Chip measuring 70 by 100 mils has all the active circuitry needed for an a-m transceiver. External oscillator crystals set frequencies from broadcast band to 100 MHz.

Electronic T/R switching, automatic gain control, squelch, superhet receiving -- I'd call this a pretty major miracle, not that it could be done -- after reading about today's microprocessor technology it'd take a lot to surprise me -- but that somebody actually went to the trouble of doing it. Remember what I said a few issues back in the Parts column? That the CB boom could produce some nifty parts spinoffs for techies? Behold!

The chip produces 60 milliwatts output. That's not much, but from a chip 70 by 100 mils I'll be satisfied. And 60 mils is plenty to drive a compact 1 or 2 watt linear amplifier.

There are still some big ifs here, so don't get too confident too soon. We don't know if this chip is being produced in quantity. (It was just announced in Electronics Magazine, hence the diagram.) We don't know who distributes it, or how much it will cost.

But if we can get our hands on a few... You'll have a Techie-Talkie the size of a TI slide rule calculator, with a phone pad on the front and three or four channel capacity, selective calling system, you name it.

I'll build them fancy as you folks want to pay. And the first one's for me! (And the second is for me! -- MOB.)

⁂

ROD SMITH

Born 10/29/55, I lived the first twelve years of my life in the small town of Manchester, Ky. I early demonstrated an insatiable curiosity by sticking my fingers in a light socket, to see if that would make me glow like a light. Thanks to Pavlovian conditioning, this action was soon replaced by others. For instance, thanks to my curiosity I performed some chemistry experiments not in the instruction booklet. The result was a large brown spot on the kitchen ceiling. When I was twelve we moved to Frankfort, where I still live. Though lacking much knowledge in electronics, I have still managed to tinker together several interesting gadgets, much to the grief of my sister. I have also had some experience with computers, losing several small fortunes shooting craps with one (and it was my program!). I plan to go into materials testing, so that I can spend the rest of my life crushing, twisting, stretching and otherwise having fun.

Hobbies include collecting comics, SF; reading same; studying atomic physics and just about every other known science in my spare time; and just generally having fun.

MIKE O'BRIEN

Born on May 16, 1949 (and much too old for this sort of thing, harrumph!) Mike O'Brien brought joy to his relatives and friends at a very early age. His uncle found him sitting on the floor at the age of four with a tube of white powder in his hand. The following dialog ensued:

"What'cha got there, Michael?"

"I got some Diatomaceous Earth!"

"Good-bye, Michael!"

But the young O'Brien soon moved up from microscopy to the wonderful world of chemistry, where he found that the dense white fog to be expected from sublimated ammonium hydroxide just didn't seem to put in a very impressive appearance. It soon became evident, however, that the problem lay in the fact that his parents had located his laboratory in close proximity to the furnace intake, and that the dense white fog had indeed put in a very impressive appearance everywhere else in the house.

It was not until high school, however, that he moved into the world of real pyrotechnics. His thermite was so successful that it cause reports of an "Unidentified Parked Object" (or UPO, not to be confused with the military) which had landed in his side yard. Actually, hot cinders had landed on his father's new car, but luckily had not injured the paint. He had, however, learned that even ceramic is not impervious to thermite if it is present merely as a thin veneer covering an iron dish. Does make a pretty show, though.

A brief detour into amateur radio basically ended when his DX-40, reputedly a very good machine, took on the tendency merely to rumble and heat up the final amp rather than oscillate properly.

College brought a degree in physics, heavy on chemistry, the deceased shards of the SF club preceeding Ro Nagey's, and an expanded mind. He met Sarah Shaw (q.v.), and married her after a year or so of graduate school. A fannish marriage, naturally. Aside, of course, from the presence of several of the groom's relatives, one of whom is fondly known as "Attila the Hun".

After collecting a Master's in Physics by accident, Mr. O'Brien proceeded in a perfectly natural manner to throw it all over and start earning gobs of money in computing, where he prefers to think of himself as a wizard rather than a systems jock. It's a much nicer fantasy and pays the same.

SARAH SHAW

Sarah Shaw was born in California in 1953 and left it a year later. She has been intending to return ever since, and may make it there yet. Her ancestry has proved to be so militantly American (no foreign ancestry yet found in seven generations of searching) that her only consolation lies in plotting the internal subversion of the DAR. Her father was an untenured professor with an unfortunate tendency to stand up for his rights. For twenty years, therefore, he travelled rather heavily. Sarah was convinced at an early age that she had been born on another planet, since there was no spot she'd seen on this one that was warm enough for her. She may still be seen today bundled in heavy sweaters and cursing Chicago winters. After playing in the role of "The Outcast" throughout junior high school and high school, she succeeded in finding friends at Michigan State University, which incidentally she never attended. It was then only natural for her to marry someone who attended school 50 miles away in Ann Arbor, after first moving to Illinois. Only then did it become evident that she and her husband had lived in Ann Arbor simultaneously one year, but had met when her parents were living in Halifax. Hence her nickname of the "Wandering Wasp". Three years of liberal arts education (including majors in political science, anthropology, history, and Russian) culminated in a decision to go into engineering and push off graduation seemingly forever. It is her studied opinion that she'll never escape, so she is now considering switching to environmental engineering instead of electrical. She has been known to work with stained glass, lapidary, jewelry, weaving, spinning, quilting, embroidery, baking, and any number of non-technical (and hence cheap) technologies. She is interested in home computing, but challenges anyone to come up with any use for home computers which will become widespread among non-techies, and hence become marketable. Her favorite hobby is planning the doubling of the family income and expenditures.

FORKS AND DÆMONS

BY MIKE O'BRIEN

In line with Jeff's comments about widening our base of technology, this column will be devoted to the one area of technology I really feel at home with - computing. We'll start out slow and get boring from there.

Actually, in part this column is only feasible because of the so-called "microprocessor revolution", which is supposed to usher in the era of personal computing. Well, it's a revolution I haven't joined yet, because I'm very well sublimated at work, thank you. I'm a bit of a high stickler when it comes to computer architecture, both hardware and software, and so far microprocessors have limitations that I am not willing to tolerate. I figure I'll wait them out - they'll be around to my sort of stuff in about five or ten years.

The textbook for this course, kiddies, is a maddening and delightful book by Ted Nelson, titled Computer Lib. It is priced too high (small print run), and is available at Kroch's, the Itty Bitty Machine Company in Evanston, or by direct mail from:

Hugo's Book Service
P.O. Box 2622
Chicago, Ill. 60690

My copy says $7.00, but it may be $7.50 by now. You get the revised edition.

I'll put my cards up front: The fact that I appear twice in the book has no influence whatever on my recommendation.

So what is a computer? Funny you should ask. Basically it's just a rule-following electronic device which shovels a buncha numbers around. I have an argument with those who say that they don't have to be numbers. They're all just a collection of two-state devices, and if you really have to go in there and poke around it's best just to regard them as numbers. But when they come out they can be letters or anything, including (digitized) pictures.

Computers are electronic. I apologize for this, but there's just no getting around it. You play with computers and you find out a bit, at least, about electronics. You don't learn any chemistry (though you may learn quite a bit of math), and you learn only the far outer fringes of psychology (all that's available late at night in the Center).

Let's get sketchy here, and go to The Book for details. Fundamentally, a computer consists of three parts: *memory*, which is a static device which holds a lot of data in electronic format, the *central processing unit*, which uses the data contained in memory, and *the rest of the shit*, which is the rest of the shit for doing whatever the first two can't handle. This includes terminals, secondary storage (much slower than memory but holds a lot more), and all the nice switches and such that give you a real power rush the first time you get to use them. Sometimes the rest of the shit is given the fancy name *peripherals*, but never forget what it is really. It covers a multitude of sins, or may uncover them if things aren't working right.

Anyway.

What happens is this: the central processing unit, or CPU, is wired to do certain things when it encounters certain data in memory. It has this little internal register (a place to put a number) called the *program counter*, which contains an "address" in memory. Every location in memory has an "address", starting at 0 and going up by 1 for every "word" (or number, really - it's just called a word for historical reasons). The computer just goes to the specified address, picks up the number there, interprets it as an instruction, does the instruction, and goes on to the next address. Instructions have to do with shuffling data from here to there, doing arithmetic, and testing results. Also you can jump to someplace else and start doing things there. Go look at the book.

The CPU can also start some of the external devices going. It shovels characters out to terminals and starts the big information stores going. These latter have huge amounts of information ready to dump into memory where the CPU can get at them, but they run a lot slower than the CPU. Rather than waiting for them, the CPU generally just starts them up and then goes on to something else. They tell the CPU when they're done and the CPU then goes and does whatever it wants to with the data. Then it can request the new stuff to be written back out. To the user this just all looks like flashing lights.

The fun comes when you try to do something useful. You see, the CPU only understands instructions like, "Move this to there, test the result, if it's zero, go here." That's really two instructions. There's nothing in there about understanding commands typed by a human on a terminal. All that has to be put in as a "program", a (typically large) set of instructions for doing something useful to humans. Then you somehow have to get this program into memory and start the computer running it. Then when it's done that one, you have to get another one in. And if one should go sour because it had a mistake in it (and they almost always do, realistically), you have to figure out what went wrong. Naturally, other programs have been developed to make this task easier, and to make it possible for more than one person to use the machine at once without bothering others, even if his program goes sour. These monster programs are called "operating systems", and I'll go into them next time.

Oh, yes. The column title? Part of the wonderful world of operating systems, of course!

GT MASTERPIECE

DIRECTORY EDITOR
Proposal for Master Project

by
Michael T. O'Brien

The directory editor, "ded", is an attempt to make life a little easier for computer programmers on the UNIX operating system. Its main purpose is to organize a user's files, something like the index on a file cabinet. It manages a separate index file which contains information about all a user's files. This index file is created by the directory editor when it is invoked for the first time in a user's directory, and is updated every time the editor is re-entered. The following services are supported by the directory editor:

1) A short (14 character) descriptive message may accompany each file. The user types in this message for any file he wishes and it is then displayed along with the file's name.

2) The directory editor, when it initializes its index or when it finds a new file, attempts to figure out what type of file it is. It knows about assembler and C language files, object files, directories, library archives, and special character set files. It tries to figure out what type of file (C or assembler) each object file is by looking at the surrounding files for a source-language file of the same name.

3) The main purpose of the directory editor is to provide a facility for single-keypress compilation. There are flag variables associated with each file in a directory, and these variables may be set by the user to indicate whether or not the file is to be included in a compilation, and if so, in what order it is to come. A single keypress then causes the editor to order the files according to the specified order found in the flag words, and submit them to the compiler (or assembler). The clever part is that the editor checks to see whether a given object file is more recent than the last modification to the associated source file. If so, the object file reflects the current source file, and no re-compilation of that file is required. Only the object file is fed to the compiler, which is already smart enough to check file types.

4) Each file is shown with an associated single-letter index, by which it may be indicated in commands to the directory editor. If the letter is pressed with no command associated, the UNIX text editor is invoked on that file, if it is not an object file. Thus, the most common activities of program development on UNIX are supported -- the constant shift between editing and compiling is reduced to single key-presses, and constant reminders are available to the author concerning the nature of his files.

Planned, but not yet implemented, are more stringent type checks, such that compilation order may only be specified for source files, etc. Also, further services may be provided, such as file re-naming, transfer to a subdirectory, temporary escape to the standard UNIX command monitor, etc.

Respectfully submitted to the
Board of General Technics in
partial fullfilment of the re-
quirements for certification
as Master Tinkerer.

THE MOB

Here we is, in all our radiant glory! If I've made any errors here, or if (as often happens) you've moved since I last took your address, let me know right away! Also, please supply phone numbers were they're missing or wrong. Communications is vital!

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